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Abstract

HIGH-PRESSURE REACTOR VESSELS

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The high-pressure vessels water-water reactors built in the USSR have been designed so as to ensure their full industrial manufacture and the possibility of shipment over the USSR railways.

The designers had to solve many problems (including metallurgical, engineering, welding, the problem of strength, etc) and to carry out research to determine the structural features which would innance the vessel reliability.

The paper discusses the requirements to the materials of the vessel for a large water-cooled water-moderated reactor, problems involved in the choice of the materials, the corrosion stability of the materials, etc.

A great deal of attention is devoted to the investigation of the vessel in a stressed condition, investigation of the material strength at repeated static loading under conditions which approximate the actual working conditions, evaluation of the marginal strength and strength tests on full-size and scale models. Choice of the seals, and seal performance test on full-size and scale models are also discussed.

The paper touches upon the vessel performance under alternating conditions, since large thicknesses and non-uniform heating of the vessel by the coolant result in considerable stresses caused by the difference of the temperature in various elements of the vessel. The description of the approaches to the solution of these problems is given, including the problem of the serviceability of electrically welded butt joints from steels with different coefficients of linear expansion.

The correct solution of the engineering problems determines, to a large degree, the performance, life and reliability of the vessel. Therefore, the paper deals with some of the key engineering problems and with the problems of the quality control.

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